Examining the Effects of Resistance Training on the Performance of Sprinters of School Athletes

A SYNOPSIS

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CHAPTER – I

INTRODUCTION

Resistance training can improve health and performance depends on the individualôs genetic makeup,program design and implementation, and training status or level of fitness. The rate of performance enhancement differs considerably between previously untrained and resistance training is recommended by National healthorganizations for incorporation into a comprehensive fitness program that includes aerobic and flexibilityexercise. Its potential benefits on health and performance are numerous; it has been shown to reduce body fat,increase basal metabolic rate, decrease blood pressure and the cardiovascular demands to exercise, improve blood lipid profiles, glucose tolerance, and insulin sensitivity, increase muscle and connective tissue cross-sectional area, improve functional capacity, and relieve low back pain. Many improvements in physical function and athletic performance are associated with the increases in muscle strength, power, endurance, and hypertrophy observed during resistancetraining. The key element to effective resistance training is supervision by a qualified professional and the properprescription of the program variables. Proper programdesign, *i. e. that* which uses progressive overload, variation,and specificity, is essential to maximize the benefitsassociated with resistance training.Trained individuals, as trained individuals have shownmuch slower rates of improvement (Komi, 1992; Leighton, 1967). These datademonstrate the difficulty in improving with greater levelsof fitness, and stress the importance of a proper resistancetraining program design in order to progress further. It isimportant to note that progression is not always the majorgoal. Once a certain level of fitness is attained, manyindividuals tailor their programs to maintain that level.

Resistance training is a modality of exercise that has grown in popularity over the past two decades, particularly for its role in improving athletic performanceby increasing muscular strength, power and speed, hypertrophy, local muscular endurance, motor performance, balance, and coordination (Aaberg, 1999;Starkey1996). Traditionally,resistance training was performed by few individuals (e.g., strengthathletes and those who strived to gain muscle hypertrophy such as body builders). However, now have a better understanding of the health-related benefits of resistance training; resistance training is now a

popular form of exercisethat is recommended by national health organizations such as the American College of Sports Medicine and the American Heart Association (Kraemer,1997) for most populationsincluding adolescents, healthy adults, the elderly, and clinical populations. The key factor to successful resistance training at any level of fitness or age is appropriate program design. Program design entails proper exercise instruction, goal setting, a method of evaluation of training progress toward training goals, the correct prescription of the acute program variables, and the inclusion of specific methods of progression targeting particular areas of muscularfitness.

The benefits of resistance training in both competitive and recreational athletes have been well documented over the past Two decades. Improvements in muscle strength and power, increase in muscle size, and improvement in sports performance are common benefits resulting from resistance training programs.Traditionally, strength athletes seeking to improve muscle strength, hypertrophy, power, and sports-specific fitnessalmost exclusively performed resistance training. Although it has been shown to have profound effects on thesephysical fitness components, only recently have the health-related benefits of resistance training been elucidated. It isnow a popular form of exercise that is recommended by National health organizations such as the AmericanCollege of Sports Medicine (ACSM), American Heart Association, and the American Association for Cardiovascularand Pulmonary Rehabilitation, in conjunction with other modalities of exercise (*ie*, aerobic, flexibility), for then maintenance and improvement of health and performance (Kraemer,2002;Carpinelli,2004). Particularly when incorporated into a comprehensivefitness program, resistance training reduces severalrisk factors associated with many diseases and physical ailments, and improves the quality of life by preserving, and improving functional capacity(Holloszy, 1984). In addition, it can improve athletic performance by increasing muscularstrength, power, speed, size, endurance, balance, and coordination (Young, 1993; Watson, 1995). The vast body of literature examiningresistance training supports its inclusion into the daily exercise regimens of the adolescent, adult, and elderlypopulations. However, it is important that each individual participating in a resistance training program has adequateunderstanding of fundamental principles and techniques, and in certain cases be supervised by qualified professionals for the prevention of injury and for maximizing the associated benefits(DeHoyos,1997; Taafe, 1999).In order to maximize the benefits of resistance training, adherence to three basic principles is mandatory.

Physical activity easily is incorporated into a holistic learning body and mind unit. Teaching non-traditional sports to students may also provide the necessary motivation for students to increase their activity, and can help students learn about different cultures. Physical education students providesa great opportunity to integrate academic concepts from other subjects as well (social studies from the example above), which may now be required of many Physical education teachers. The four aspects of physical education are physical, mental, social, and emotional.

Statement of the problem

Examining the Effects of Resistance Training on the Performance of Sprinters of School Athletes

Objectives of the Study

1. The objective of the study will be to determine the effects of resistance training on Speed performance of the sprinters of school athletesô
2. The objective of the study will be to determine the effects of resistance training on Power performance of the sprinters of school athletesô
3. The objective of the study will be to identify the sports have effects of resistance training on Agility performance of the sprinters of school athletes.
4. The objective of the study will be to identify the sports have effects of resistance training on Reaction - Time performance of the sprinters of school athletes.

Significance Of The Study

The present study will be help the coaches, sports trainers, administrators and the student athletes.

1. The present study will be help Coaches, Sports trainer and Physical education teachers to know the effects of resistance training on performance related sprinters components.

2. The result of present study will be helpful to Coaches for giving appropriate training to the players.

3. The findings of the study will be helping Coaches, Trainer, Physical education teachers and players to improve performance.

4. The result of study will add further knowledge of resistance training.

5. The finding of the study will be providing a guide line to the future research investigators to conduct further research in this field.

Hypotheses

1. There will be significant effects of Resistance training to the improvement of sports performance of the sprinters of school athletes.
2. There will be significant effects of Resistance training to the improvement of speed performance of the sprinters of school athletes.
3. There will be significant effects of Resistance training to the improvement of Power performance of the sprinters of school athletes.
4. There will be significant effects of Resistance training to the improvement of Agility performance of the sprinters of school athletes.
5. There will be significant effects of Resistance training to the improvement of Reaction - Time of the sprinters of school athletes.

Limitations of the Study:

1. The participant belonged to different level of performance hence the prior experience of the players may be considered as a limitation to the study.

2. The participant belonged to different training background this may be also considered as the limitation of the study.

3. There was no control of research scholar on the diet of subject.

4. The effects of weather, condition was considered as limitations.

DELIMITATION OF THE STUDY

1. The present study will be delimited to the admitted students of Indira Gandhi High School, Cidco Nanded.

2. The age group of subjects will be 12-18 years.

3. The training will be given in the Indira Gandhi High School, Cidco Nanded.

4. The duration of training was 12 weeks.

5. The study will be delimited to 40 subjects as an experimental and 40 as a Control group.

6. The study will be delimited of the following performance-related components.

a. Speed

b. Power

c. Agility

d. Reaction - Time

7. The study will be delimited to male subject only.

DEFINITIONS OF THE TERMS USED

- **Resistance Training**: This is a well systematic structured programmer of exercises given to the subjects. Under the condition of resistance.
- **Speed:** The capacity of the individual to perform successive movements of the same pattern at a fast rate.
- **Power:** The ability to release maximum muscular force in an explosive manner in the shortest duration.

- **Agility:**The ability of the body to change the direction rapidly and accurately.
- **Reaction Time:**The time from the presentation of stimulus to the beginning of movement.

CHAPTER –II

REVIEW OF RELATED LITERATURE

In this chapter the study related to the problem selected are given below:

Van Ettenet.al.(1997) investigatedto examine the effect of an 18-wk weight-training program on average daily metabolic rate (ADMR). Before the intervention and in weeks 8 and 18(T0, T8, and T18, respectively) data on body composition, sleeping metabolic rate (SMR), food intake, energy cost of the weight-training program (EEex), and nontraining physical activity (accelerometer) were collected in the exercise group (EXER,n = 18 males). ADMR was determined in a subgroup (EX12, n = 12) by using doubly labeled water. At T0 and T18, data (except ADMR) were also collected in a control group (Con, n = 8). Body mass did not change in EXER or Con. Fat-free mass increased only in EXER with 2.1 ± 1.2 kg, whereas fat mass decreased in EXER as well as Con (2.0 ± 1.8 and 1.4 ± 1.0 kg, respectively). Initial ADMR (12.4 ± 1.2 MJ/day) increased at T8 (13.5 ± 1.3 MJ/day,P< 0.001) with no further increase at T18 (13.5 ± 1.9 MJ/day). SMR did not change in EXER (4.8 ± 0.5, 4.9± 0.5, 4.8 ± 0.5 kJ/min) or Con (4.7 ± 0.4, 4.8 ± 0.4 kJ/min). Energy intake did not change in EXER (10.1 ± 1.8, 9.7 ± 1.8, 9.2 ± 1.9 MJ/day) or Con (10.2 ± 2.6, 9.4 ± 1.8, 10.1 ± 1.5 MJ/day) and was systematically underreported in EX12 (ī 21 ± 14, ī 28 ± 18, ī 34 ± 14%,P< 0.001). EEex (0.47 ± 0.20, 0.50 ± 0.18 MJ/day) could only explain 40% of the increase in ADMR. Nontraining physical activity did not change in both groups. In conclusion, although of modest energy cost, weight-training induces a significant increase in 18-wk weight-training program.

Skeltonet. al., (1995),investigated the effects of progressive resistance strength training on the isometric strength explosive power & selected

functional abilities of healthy women. The 52 subjects were recruited. The five dropped out before & seven during study. The subjects were divided in to two groups, 20 exercises& 20 controls. The age of subjects ranged from 75 to 93 years the experimental group perfumed training for 12 weeks. The pre and post training comparison were made by using analysis of variance or co-variance& one sided fisher exact test the change 27%, P= 0.03), isometric knee flexor strength (22 %, P= 0.05), handgrip strength (4%, P= 0.05), leg extensor power (18 %, p=0.05) but improvement in leg extensor power did not reach statistical significance. The others functional test did not improve. It is concluded resistance training can produce substation increase in muscle strength & in power standardized for body weight healthyolder women.

Broederet. al. (1992), Investigated on 47 males aged 18-35 y. Subjects were randomly assigned to either a control (C), resistance-trained (RT) or endurance-trained (ET) group. After training both exercise groups showed significant declines in relative body fat either by reducing their total fat weight and maintaining fat-free weight (ET) or by reducing their total fat weight and increasing fat-free weight (RT). RMR did not significantly change after either training regimen although a small decline in energy intake was observed along with an increase in energy expenditure [ET, 2.721 MJ (650 kcal) per training day]. These results suggest that both endurance and resistance training may help to prevent attenuation in RMR normally observed during extended periods of negative energy balance (energy intake less than expenditure) by either preserving or increasing a person's fat-free weight.

Jacobs I.et.al.(1987), Recent studies carried out in the United States and Sweden have demonstrated that strength training can improve +Gz acceleration tolerance. Based on these findings, the Canadian Forces have introduced a training program for aircrew of high performance aircraft. This report describes the changes in physical fitness components considered relevant to +Gz tolerance

after 12 weeks of training with this program. Prior to beginning training, 45 military personnel were tested, but only 20 completed a minimum of 24 training sessions. The following variables were measured in these 20 subjects before and after training: maximal strength of several large muscle groups during isokinetic contractions, maximal aerobic power and an endurance fitness index, maximal anaerobic power, anthropometric characteristics, and maximal expiratory pressure generated during exhalation. Training involved hydraulic resistance circuit training 2-4 times/week. The circuit consisted of 3 consecutive sets at each of 8 stations using Hydra-Gym equipment. The exercise rest ratio was 20:40 s for the initial 4 training weeks and was then changed to 30:50. After training the changes in anthropometric measurements suggested that lean body mass was increased. Small, but significant, increases were also measured in muscle strength during bench press, biceps curls, squats, knee extension, and knee flexion. Neither maximal anaerobic power (i.e. muscular endurance) nor maximal expiratory pressure was changed after the training. Indices of endurance fitness were also increased in the present study. The relatively small increases in strength are probably due to the design of the exercise rest ratio which resulted in improved strength and aerobic fitness.

Anderson T. (1982), investigated to the effects of three resistance training programs on male college students' muscular strength and absolute and relative muscular endurance. Results show that human skeletal muscle makes both general and specific adaptations to a training stimulus, and that the balance of these adaptations is to some extent dependent upon the intensity and duration of the training protocol use Lippincott William and Wilkins (1994), ñStrength/Endurance Effects from Three Resistance Training Protocols with Womenò. Fifty college women were randomly assigned to one of three resistance training protocols that employed progressive resistance with high resistance/low repetitions (HRLR), medium resistance/medium repetitions

(MRMR), and low resistance/high repetitions (LRHR). The three groups trained on the same resistance exercises for 9 weeks at 3 sets of 6 to 8 RM, 2 sets of 15 to 20 RM, and 1 set of 30 to 40 RM, respectively. Training included free weights and multi-station equipment. The 1-RM technique is used for strength testing, and muscular endurance tests consisted of maximum repetitions either at a designated resistance or at a percentage of 1-RM. There were significant pre/post strength increases in both upper and lower body tests, but no significant post-treatment difference in muscular strength among the three protocols. Absolute muscular endurance increased significantly on 4 of 6 pre/post comparisons, while relative endurance increased significantly on only 4 of 12 comparisons. HRLR training yielded greater strength gains. LRHR training generally produced greater muscular endurance gains, and the percentage increase in absolute endurance is approximately twice the increase in strength for all groups. Lower body gains in both strength and endurance were greater than upper body gains.

Chui (1964),Investigated on seventy two male subjects formed three experimental groups and performed weight training exercises : Group R (Rapid dynamic contraction method), Group S (Slow dynamic contraction method) Twenty four male subjects formed the control group, a cable tensiometer was used to obtain eight strength scores for each subject speed of movesment times against no resistance in the size movements and against resistance in the same movements in specified increments were taken Group I, Group R and Group S gained strength and at the same time gained speed of movement measured against no resistance and against resistance. The findings of this study would appear to warrant the conclusions that a) gain in strength exerted in performing a movement are accompanied by gain in speed of execution of same movement against no resistance and against resistance use of one method is not significantly greater (P = .05) than gain made by the use of other method.

CHAPTER – III

METHODOLOGY

In this chapter selection of subject, collection of data tools of the study, administration of the test and statistical procedure will be described.

Target population:

Two groups were targeted experimental and control. The forty newly admitted male school students consider as experimental group who will be doing Gandhi high school, Nanded, and forty other students consider as a control group were selected as subject for present study. Training will be given to only experimental groups.

Research Design:

The design in a research study refers to ñthe researcherôs overall plan for answering the researcherôs question or testing the research hypothesesò (Politet al., 2001, p.167). This study involves effects of resistance training on performance of the sprinters of school athletesô in an experimental design. Ultimately, the findings will increase the awareness of high school students. Coaches, sports trainers physical educationist and sports person regarding resistance training for sports performance.

Demographic Information

The data will be collected through respondents in the form of different experimental tests. The demographic information about Gender, age, daily smoking, drug use, etc. will be obtained before seeking responses.

Selection of Subject:

Total 40non-sprinters student athletes and 40 school sprinters student athletes will be selected as a subject for the present study. Their age ranged from 12 to 18 years. Those Students participated in minimum school tournament have consider for students athletes and those students not participated any sports activities at minimum school tournament as consider for non-student athletes.

Selection of Tests:

- Speed Test:
- Power Test:
- Agility Test:
- Reaction time test

Collection of Data:

Datawas collected from the 40 school sprinters student athletesas an experimental group of Indira Gandhi high school, Nanded. Pre and Post Test was taken from forty other students as a control group Resistances training was given to the experimental group.

Statistical Technique:

To analyze the data mean scores, standard deviation, t-test & anova will be used .The level of significant will be set up at 0.05 level of confidence.

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